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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/576,421	04/19/2006	Tetsuya Hayashi	043888-0447	9484

53080 7590 10/13/2009

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EXAMINER	
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ART UNIT	PAPER NUMBER
1795	
MAIL DATE	DELIVERY MODE
10/13/2009	PAPER

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/576,421
Filing Date: April 19, 2006
Appellant(s): HAYASHI ET AL.

Michael E. Fogarty
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed July 9, 2009 appealing from the Office action mailed January 6, 2009.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

Examiner submits herewith a copy of the following document:

- Official Translation of Takayama (JP 09-035738).

The Abstract and Machine Translation in English of Takayama (JP 09-035738) were listed by the Examiner in the July 15, 2008 “Notice of References Cited" and were provided to the Appellant with the July 15, 2008 Non-Final Office Action.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

A) Claims 1, 3-5, and 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mizutani (US 2003/0180605) in view of Reichert et al. (US 6,217,623) and Takayama (JP 09-035738).

With regard to claims 1 and 3-4, Mizutani et al. teaches a lithium ion secondary battery (paragraphs [0037]-[0038]; Figure 1) including an electrode group that comprises:

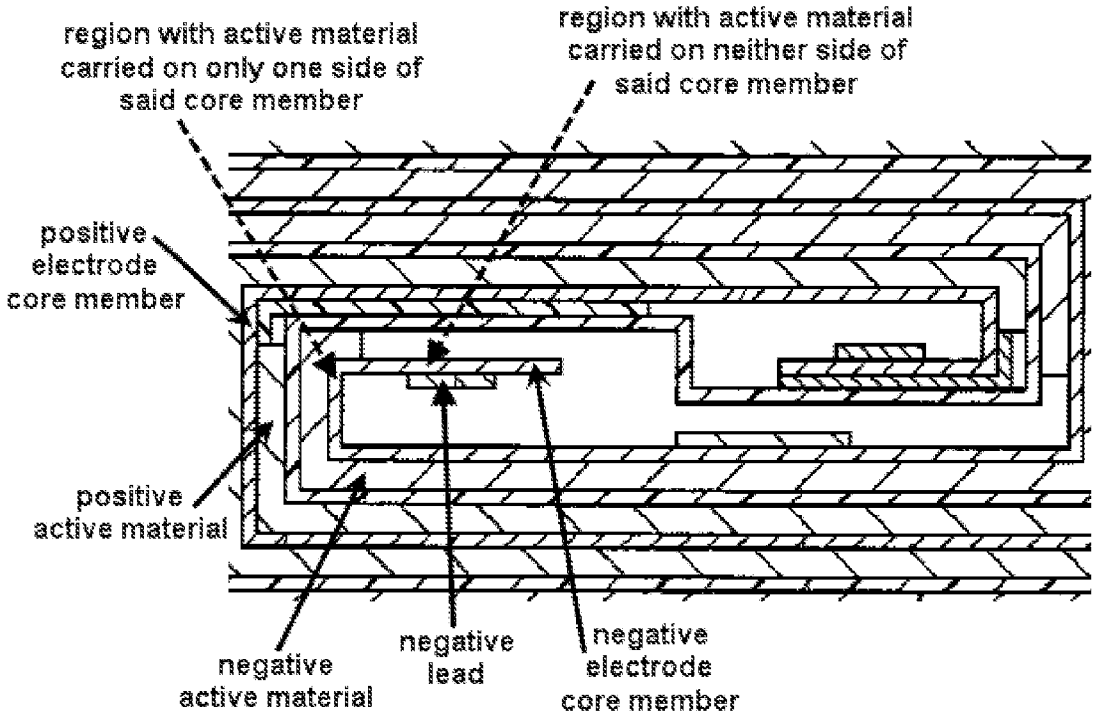
a positive electrode comprising a positive electrode core member (15, paragraph [0044]; Figure 1) and a positive electrode active material layer (2, paragraphs [0038] & [0044]; Figure 1) carried on said positive electrode core member (paragraph [0044]; Figure 1),

a negative electrode comprising a negative electrode core member (16, paragraph [0047]; Figure 1) and a negative electrode active material layer (3, paragraph [0038]; Figure 1) carried on said negative electrode core member (paragraphs [0038] & [0047]; Figure 1),

a porous film (1, paragraphs [0038] & [0050]; Figure 1) disposed between said positive electrode and said negative electrode (paragraph [0038]; Figure 1), wherein said positive electrode and said negative electrode are wound (paragraph [0038]; Figure 1), and wherein said negative electrode has, on the initial winding side, a region where said negative electrode active material layer is carried on neither side of said core member (paragraph [0056]; Figure 1) and an adjoining region where said active material layer is carried on only one side of said core member (paragraph [0038]; Figure 1), and

a lead (9, paragraphs [0038] & [0056]; Figure 1) provided in the region of negative electrode where the active material layer is carried on neither side of said core member (9, paragraphs [0038] & [0056]; Figure 1).

The following illustration (modification of Mizutani Figure 1) is provided for clarification:



Mizutani fails to teach the specified composition of the porous film layer.

Reichert et al. teaches a porous film layer (26, col. 3, lines 23-25 & 34-41 & col. 5, lines 32-39; Figures 1-2) comprising a filler and a binder (col. 5, lines 32-39) in order to allow the porous film layer to be sprayed directly onto an anode or/and a cathode (col. 5, lines 32-39), to increase ease of manufacture (col. 5, lines 47-54), and to create a porous film layer than contains a primarily beneficially reactive material that will not form by-products that can cause the cell to self-discharge (col. 5, lines 47-54).

It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the porous film layer of Mizutani with the porous film layer of Reichert et al. in order to allow the porous film layer to be sprayed

directly onto an anode or/and a cathode (col. 5, lines 32-39), to increase ease of manufacture (col. 5, lines 47-54), and to create a porous film layer than contains a primarily beneficially reactive material that will not form by-products that can cause the cell to self-discharge (col. 5, lines 47-54).

Modified Mizutani also fails to teach a winding core with a recess at a specified position.

Takayama teaches the concept of a winding core (1, paragraph [0013]; Figures 2), wherein the initial winding side of said winding core has a recess at a position where it comes into contact with the starting position of the active material layer of the inner electrode (paragraphs [0016]-[0017]; Figure 2), and said recess corresponds to at least a part of the thickness of said inner electrode (paragraphs [0016]-[0017]; Figure 2) in order to reduce or eliminate the level difference caused by the inner electrode thickness and thereby create a reliable battery (paragraphs [0006] & [0020]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the winding core with a recess at a position where it comes into contact with the starting position of the active material layer of the inner electrode of Takayama to the lithium ion secondary battery of modified Mizutani et al. in order to reduce or eliminate the level difference caused by the inner electrode thickness and thereby create a reliable battery (paragraphs [0006] & [0020]).

With regard to claims 5 and 7-8, Mizutani et al. teaches a method for producing a lithium ion secondary battery (paragraphs [0058]-[0071]) comprising the steps of:

(a) forming a positive electrode active material layer (2, paragraphs [0038] & [0044]; Figures 1 & 4) on both sides of a positive electrode core member (15, paragraph [0044]; Figures 1 & 4) to obtain a positive electrode (paragraph [0044]; Figure 4),

(b) forming a negative electrode active material layer (3, paragraph [0038]; Figures 1 & 5) on both sides of a negative electrode core member (16, paragraph [0047]; Figures 1 & 5) to obtain a positive electrode (paragraph [0047]; Figure 5),

(c) forming a porous film (1, paragraphs [0038] & [0050]; Figure 1) on a surface of said positive electrode and said negative electrode (paragraphs [0066]-[0068] & [0038]; Figures 7A-7D)

(d), winding said positive electrode and said negative electrode with a porous film inbetween said positive and negative electrodes to obtain an electrode group (paragraphs [068]-[0069]; Figures 7A-7D), and

(e) welding a lead to said region of said positive electrode and said negative electrode where the active material layer is carried on neither side of said core member (paragraphs [0055]-[0056]; Figures 1 & 4-5),

wherein said steps (a) and (b) comprise the step of providing, on the initial winding side of said positive electrode and said negative electrode, a region where said active material layer is carried on neither side of said core member

(paragraph [0056]; Figure 1) and an adjoining region where said active layer is carried on only one side of said core member (paragraph [0038]; Figure 1), but fails to teach the specified composition of the porous film layer.

Reichert et al. teaches a porous film layer (26, col. 3, lines 23-25 & 34-41 & col. 5, lines 32-39; Figures 1-2) between an anode and a cathode (col. 2, lines 55-67), where the porous film layer comprises a filler and a binder (col. 5, lines 32-39) in order to allow the porous film layer to be sprayed directly onto an anode or/and a cathode (col. 5, lines 32-39), to increase ease of manufacture (col. 5, lines 47-54), and to create a porous film layer than contains a primarily beneficially reactive material that will not form by-products that can cause the cell to self-discharge (col. 5, lines 47-54).

Reichert et al. and Mizutani are considered analogous art because they involve the same field of endeavor: secondary batteries.

It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the porous film layer of Mizutani with the porous film layer of Reichert et al. in order to allow the porous film layer to be sprayed directly onto an anode or/and a cathode (col. 5, lines 32-39), to increase ease of manufacture (col. 5, lines 47-54), and to create a porous film layer than contains a primarily beneficially reactive material that will not form by-products that can cause the cell to self-discharge (col. 5, lines 47-54).

Modified Mizutani also fails to teach the concept of a winding core with a recess at a specified position.

Takayama teaches the concept of a winding core (1, paragraph [0013]; Figures 2), wherein the initial winding side of said winding core has a recess at a position where it comes into contact with the starting position of the active material layer of the inner electrode (paragraphs [0016]-[0017]; Figure 2), and said recess corresponds to at least a part of the thickness of said inner electrode (paragraphs [0016]-[0017]; Figure 2) in order to reduce or eliminate the level difference caused by the inner electrode thickness and thereby create a reliable battery (paragraphs [0006] & [0020]).

Takayama and Mizutani are considered analogous art because they involve the same field of endeavor: secondary batteries.

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the winding core with a recess at a position where it comes into contact with the starting position of the active material layer of the inner electrode of Takayama to the lithium ion secondary battery of modified Mizutani et al. in order to reduce or eliminate the level difference caused by the inner electrode thickness and thereby create a reliable battery (paragraphs [0006] & [0020]).

B) Claims 2 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mizutani (US 2003/0180605), Reichert et al. (US 6,217,623), and Takayama (JP 09-035738), as applied to claims 1 and 5 above, respectively, and further in view of Komatsu et al. (US 2002/0146626).

The disclosure of Mizutani, Reichert et al., and Takayama as discussed above is fully incorporated herein.

With regard to claims 2 and 6, modified Mizutani fails to teach a separator disposed between said positive electrode and said negative electrode, wherein the resulting product is wound.

Komatsu et al. teaches a separator (31, paragraphs [0039]-[0040]; Figures 3 & 5) disposed between positive (10, paragraph [0040]; Figure 5) and negative (20, paragraph [0040]; Figures 3 & 5) electrodes (paragraphs [0039]-[0040]; Figures 3 & 5) where a porous film (33, 41; paragraphs [0039]-[0040]; Figures 3 & 5) is also disposed between positive (10, paragraph [0040]; Figure 5) and negative (20, paragraph [0040]; Figures 3 & 5) electrodes (paragraphs [0039]-[0040]; Figures 3 & 5), wherein the resulting product is wound (paragraph [0041]), in order to bond the electrode(s) to the separator, maintain a constant distance between the electrodes, and avoid capacity drop after repeated charges/discharges (paragraph [0045]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the separator of Komatsu et al. to the lithium ion secondary battery of modified Mizutani et al. in order to bond the electrode(s) to the separator, maintain a constant distance between the electrodes, and avoid capacity drop after repeated charges/discharges (paragraph [0045]).

(10) Response to Argument

On pages 5-7 of the Appellant's Remarks, Appellant argues that "there is no valid basis to make the proposed combination [of Mizutani (US 2003/0180605) and Takayama (JP 09-035738)]" (Appellant's Remarks, page 5) and that "the stated objective in the Abstract of Mizutani is that useless parts which have no contribution to power generation are reduced in order to provide a non-aqueous electrolyte battery which has a high energy density" (Appellant's Remarks, page 5).

The Examiner respectfully disagrees with the Appellant's argument that "there is no valid basis to make the proposed combination [of Mizutani (US 2003/0180605) and Takayama (JP 09-035738)]" (Appellant's Remarks, page 5) and that "the stated objective in the Abstract of Mizutani is that useless parts which have no contribution to power generation are reduced in order to provide a non-aqueous electrolyte battery which has a high energy density" (Appellant's Remarks, page 5) because Mizutani clearly states that the component which is being eliminated in order to improve energy density is the active material layer on the outermost periphery of the wound electrode because it has substantially no contribution to the electromotive as a battery (Mizutani, paragraphs [0015], [0056], & [0080]).

On pages 5-6 of the Appellant's Remarks, Appellant argues that "the electrode assembly [of Mizutani] does not require a winding core composed of a wound end of the separator or a winding core material provided in the approximate center part"

(Appellant's Remarks, page 5) and that one in the art would not be motivated to combine the winding core of Takayama with the battery of Mizutani, because the winding core is a useless part that does not contribute to power generation" (Appellant's Remarks, page 6).

The Examiner respectfully disagrees with the Appellant's argument "the electrode assembly [of Mizutani] does not require a winding core composed of a wound end of the separator or a winding core material provided in the approximate center part" (Appellant's Remarks, page 5) and that one in the art would not be motivated to combine the winding core of Takayama with the battery of Mizutani, because the winding core is a useless part that does not contribute to power generation" (Appellant's Remarks, page 6) because the instant claims as currently written do not require a winding core composed of a wound end of the separator or a winding core material provided in the approximate center part. Furthermore, as discussed above, Mizutani clearly states that the component which is being eliminated in order to improve energy density is the active material layer on the outermost periphery of the wound electrode because it has substantially no contribution to the electromotive as a battery (Mizutani, paragraphs [0015], [0056], & [0080]). Therefore, the Examiner maintains that it would be obvious to one of ordinary skill in the art that it would be advantageous to add the winding core with a recess at a position where it comes into contact with the starting position of the active material layer of the inner electrode of Takayama instead of using a removable jig such as that used in Mizutani.

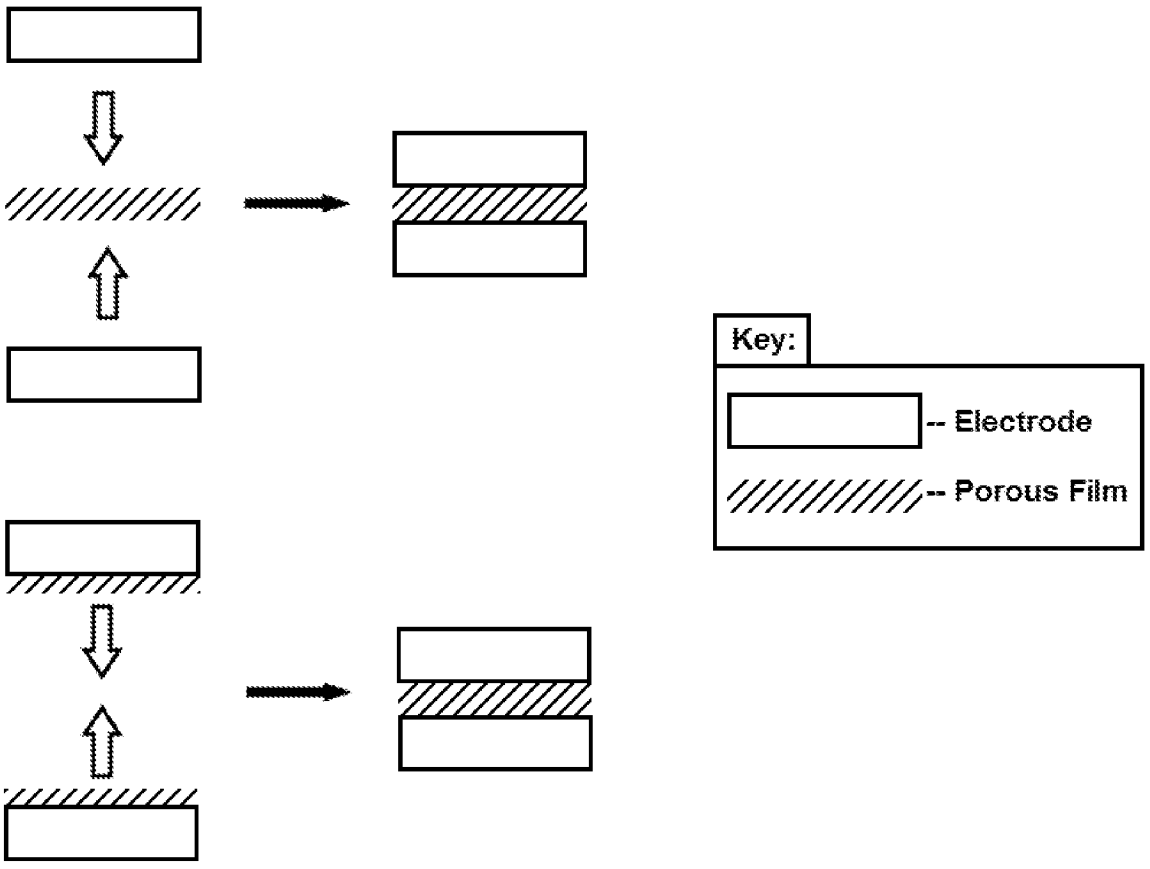
On pages 6-7 of the Appellant's Remarks, Appellants argue that "it is alleged that it would be obvious to use such a film as disclosed in Reichert with the battery of Mizutani to increase the ease of manufacture and to reduce self-discharge of the cell…. [however] it would be impossible to spray the porous film of Reichert before the formation of the positive and negative electrode, because before formation of them, there is no surface on which to spray the porous film. The order in which Mizutani and Reichert form their cells is contrary and opposite to each other" (Appellant's Remarks, page 6) and that "if a porous film containing a filler and a binder is used, such as in Reichert, the porous film can only be formed on one or the other of the positive and negative electrodes. In other words, the positive and negative electrodes cannot be disposed on both faces of one porous film because the porous film is sprayed on the electrodes, not the electrodes are formed on the film" (Appellant's Remarks, page 7).

The Examiner respectfully disagrees with the Appellant's argument that "it is alleged that it would be obvious to use such a film as disclosed in Reichert with the battery of Mizutani to increase the ease of manufacture and to reduce self-discharge of the cell…. [however] it would be impossible to spray the porous film of Reichert before the formation of the positive and negative electrode, because before formation of them, there is no surface on which to spray the porous film. The order in which Mizutani and Reichert form their cells is contrary and opposite to each other" (Appellant's Remarks, page 6) and that "if a porous film containing a filler and a binder is used, such as in Reichert, the porous film can only be formed on one or the other of the positive and negative electrodes. In other words, the positive and negative electrodes cannot be

disposed on both faces of one porous film because the porous film is sprayed on the electrodes, not the electrodes are formed on the film" (Appellant's Remarks, page 7) because:

1) the Appellant has not shown evidence that the process of forming the porous film before making the electrodes, and then placing the porous film inbetween the electrodes would produce a substantially different product then the product formed by making the electrodes, spraying the porous film directly onto one or both electrodes, and then placing the electrodes together (porous film side in)

The following illustrations are provided for clarification:



and

2) One of ordinary skill in the art would understand that in order to incorporate the advantageous concept of Reichert of having a porous film layer be sprayed "directly onto either or both anode or cathode" (col. 5, lines 32-39) to increase ease of manufacture (col. 5, lines 47-54) and to create a porous film layer that contains a primarily beneficial reactive material that will not form by-products that can cause the cell to self-discharge (col. 5, lines 47-54), the electrode(s) would need to be formed prior to the spraying of the porous film.

and

3) One of ordinary skill in the art would understand that the passage of Reichert which clearly states that the porous film layer can be sprayed "directly onto either of both anode or cathode" (col. 5, lines 32-39) supports the concept of the positive and negative electrodes being disposed on both faces of one porous film.

On page 6 of the Appellant's Remarks, Appellants argue that "it would not be possible to roll up the porous film and electrode combination of the present disclosure around a jig such as in Mizutani, without causing cracks in the film, because the winding around the jig is much tighter than the winding core" (Appellants Remarks, page 6).

The Examiner respectfully disagrees with the Appellant's argument that "it would not be possible to roll up the porous film and electrode combination of the present disclosure around a jig such as in Mizutani, without causing cracks in the film, because the winding around the jig is much tighter than the winding core" (Appellants Remarks, page 6) because:

1) The Appellant has not shown evidence that rolling up the porous film and electrode combination of the present disclosure around a jig such as in Mizutani would cause cracks in the film, or shown evidence that the winding around the jig would be much tighter than the winding around a winding core.

and

2) The Examiner notes that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references (*In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)). The Appellants argument against the combination of Mizutani (US 2003/0180605) and Reichert et al. (US 6,214,623) to reject the concept of rolling a porous film and electrode combination around a jig (Appellant's Remarks, page 6) is not persuasive because the Examiner uses the combination of Mizutani, Reichert et al., and Takayama (JP 09-035738) to reject the concept of rolling a porous film and electrode combination around a winding core. Therefore, the Applicant is attacking the Mizutani and Reichert et al. references individually where the rejection is based on combinations of references Mizutani, Reichert et al., and Takayama.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/C. L. R./

Examiner, Art Unit 1795

Conferees:

/Benjamin L. Utech/

Primary Examiner

/Jennifer K. Michener/

Supervisory Patent Examiner, Art Unit 1795